

CLAIMS

1. A method of extruding a slab of dry ice from a source of liquid CO<sub>2</sub>, said method comprising the following steps:

- blocking an extruding slot in a die at an end of a cylinder of a dry ice extruding machine;
- injecting said liquid CO<sub>2</sub> from said source into said cylinder of said dry ice extruding machine to form gaseous CO<sub>2</sub> (snow) and solid CO<sub>2</sub> therein;
- degassing said cylinder to remove gaseous CO<sub>2</sub> through vents from said cylinder while forming said snow in said cylinder;
- building a puck in said end of said cylinder having said extruding slot in said die by moving a pressure piston back and forth in said cylinder of said dry ice extruding machine during said injecting;
- unblocking said extruding slot to allow dry ice to be extruded therethrough;
- breaking said extruded dry ice upon the length thereof reaching a predetermined distance to give said slab of dry ice; and
- repeating said breaking step to create as many of said slabs of dry ice as desired.

1        2.    The method of extruding a slab of dry ice from a source of liquid CO<sub>2</sub> as recited  
2        in Claim 1, including after said unblocking step an additional step of sensing when  
3        said slab of dry ice being extruded has reached said predetermined distance to give a  
4        sizing control signal.

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6        3.    The method of extruding a slab of dry ice from a source of liquid CO<sub>2</sub> as recited  
7        Claim 2, wherein said sizing control signal activates a sizing mechanism for said  
8        breaking of said slab of extruded dry ice into a predetermined length which  
9        corresponds with said predetermined distance.

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11       4.    The method of extruding a slab of dry ice from a source of liquid CO<sub>2</sub> as recited  
12       in Claim 3, further including at the outer end of said extruding slot a forming  
13       chamber with a forming slot therein for receiving said slab of extruded dry ice  
14       therethrough, said forming slot allowing said slab of extruded dry ice to set before  
15       said breaking step.

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17       5.    The method of extruding a slab of dry ice from a source of liquid CO<sub>2</sub> as recited  
18       in Claim 4, wherein said sizing mechanism moves a sizing block adjacent said  
19       forming chamber for said breaking of said extruded dry ice in said predetermined  
20       length.

1        6.    The method of extruding a slab of dry ice from a source of liquid CO<sub>2</sub> as recited  
2        in Claim 5, wherein said sizing mechanism is pneumatically operated and said  
3        pressure piston is hydraulically operated.

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5        7.    The method of extruding a slab of dry ice from a source of liquid CO<sub>2</sub> as recited  
6        in Claim 1, including a removable gate for said blocking and said unblocking of said  
7        extruding slot.

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9        8.    The method of extruding a slab of dry ice from a source of liquid CO<sub>2</sub> as recited  
10       in Claim 7, wherein said removable gate is activated by a gate cylinder.

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12       9.    The method of extruding a slab of dry ice from a source of liquid CO<sub>2</sub> as recited  
13       in Claim 8, wherein said removable gate is pressed against said extruding slot until a  
14       puck is formed in said cylinder.

1        10.    A die for connecting to an extrusion chamber of a dry ice extruding machine,  
2        said die being used to extrude dry ice therethrough from a source of liquid CO<sub>2</sub>, said  
3        die comprising:

4                generally rectangular shaped hole in said die for extruding dry ice from said  
5        condensing chamber of said dry ice extruding machine therethrough, said generally  
6        rectangular shaped hole being tapered for proper extrusion;

7                forming chamber having a similar generally rectangular shaped hole therein,  
8        said die and said forming chamber being adjacent, said forming chamber being of  
9        sufficient length to allow extruded dry ice to set up in a solid form in said similar  
10       generally rectangular shaped hole; and

11               means for attaching said die to an end of said extrusion chamber of said dry  
12       ice extruding machine.

1        11. A die for connecting to an extrusion chamber of a dry ice extruding machine,  
2        said die being used to extrude dry ice therethrough from a source of liquid CO<sub>2</sub> as  
3        recited in Claim 10, said die further including a block for removably blocking said  
4        similar oblong shaped hole until a puck has formed in said dry ice extruding  
5        machine.

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7        12. A die for connecting to an extrusion chamber of a dry ice extruding machine,  
8        said die being used to extrude dry ice therethrough from a source of liquid CO<sub>2</sub> as  
9        recited in Claim 11, wherein said die further includes a sizing mechanism for  
10       breaking off said extruded dry ice in predetermined lengths.

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12       13. A die for connecting to an extrusion chamber of a dry ice extruding machine,  
13       said die being used to extrude dry ice therethrough from a source of liquid CO<sub>2</sub> as  
14       recited in Claim 12, wherein said die further includes a sensor for determining when  
15       said extruded dry ice reaches said predetermined length to activate said sizing  
16       mechanism.

1        14.    A dry ice extruding machine for extruding slabs of dry ice from a source of  
2        liquid CO<sub>2</sub>, a source of power connecting to said dry ice extruding machine, said dry  
3        ice extruding machine comprising:  
4                a frame;  
5                at least one extrusion cylinder mounted on said frame;  
6                a piston in said extrusion cylinder;  
7                connection of power from said source of power to said piston to cause back  
8        and forth movement of said piston in said extrusion cylinder;  
9                injection ports on said extrusion cylinder for injecting said liquid CO<sub>2</sub> into said  
10       extrusion cylinder and flashing said liquid CO<sub>2</sub> into gaseous and solid CO<sub>2</sub>;  
11               vents on said extrusion cylinder for venting said gaseous CO<sub>2</sub> from said  
12       extrusion cylinder;  
13               a die mounted on a first end of said extrusion cylinder, said die having a slot  
14       therein for extruding a slab of said solid CO<sub>2</sub> therethrough; and  
15               blocking device for blocking said slot until a puck has formed in said first end  
16       of said extrusion cylinder and thereafter removing said blocking device.

1        15.    The dry ice extruding machine for extruding slabs of dry ice from a source of  
2        liquid CO<sub>2</sub> as recited in claim 14 wherein said connection of power is a hydraulic  
3        cylinder driving said piston through a second end of said extrusion cylinder.

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5        16.    The dry ice extruding machine for extruding slabs of dry ice from a source of  
6        liquid CO<sub>2</sub> as recited in claim 15 wherein said dry ice extruding machine includes a  
7        sensor for determining if said slab has reached a predetermined length and  
8        generating a sizing control signal, said sizing control signal activating a sizing  
9        mechanism to break said slab into said predetermined length.

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11       17.    The dry ice extruding machine for extruding slabs of dry ice from a source of  
12       liquid CO<sub>2</sub> as recited in claim 16 wherein said die further includes a forming chamber  
13       with a forming slot therein so that said slab can set before being broken into said  
14       predetermined length.

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16       18.    The dry ice extruding machine for extruding slabs of dry ice from a source of  
17       liquid CO<sub>2</sub> as recited in claim 17 wherein said slot in said die and said forming slot in  
18       said forming chamber are tapered for proper extrusion.

1        19.    The dry ice extruding machine for extruding slabs of dry ice from a source of  
2        liquid CO<sub>2</sub> as recited in claim 16 wherein said sizing mechanism is a block that  
3        moves adjacent and parallel to an outer face of said forming chamber to break said  
4        slab into said predetermined length, said block being pneumatically operated.

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6        20.    The dry ice extruding machine for extruding slabs of dry ice from a source of  
7        liquid CO<sub>2</sub> as recited in claim 14 wherein said blocking device is pressed on outer  
8        opening of said slot to prevent escape of CO<sub>2</sub> therethrough while forming said puck.